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THESIS ABSTRACTS

ENERGY REQUIREMENTS AND FOOD RESOURCE OF THE CAPE VULTURE *Gyps coprotheres* IN THE MAGALIESBERG, TRANSVAAL

This study describes the energy requirements and food resource of the Cape Vulture (*Gyps coprotheres*) around the Magaliesberg escarpment range in the Transvaal Province, South Africa.

The investigations of this study were concerned with growth, energy requirements and nutritional status of hand-reared and wild nestlings, and the energy requirements of captive adult and immature Cape Vultures. From these data annual food requirements of the Magaliesberg Cape Vultures were estimated. Growth and food requirements were interpreted in terms of an adaptive breeding strategy consistent with existing hypotheses in the fields of avian breeding biology and ecology. The potential food resource of the Magaliesberg Cape Vultures was inferred from agricultural, pastoral and veterinary census data for an arbitrary potential foraging area (PFA) around the Magaliesberg escarpment range. Food requirements and food resource of the Magaliesberg Cape Vultures were evaluated, and compared with other factors in terms of the possible limiting effect of these factors on the continued existence of Cape Vultures in rural areas.

Body mass and wing length are similar for hand-reared and wild nestlings of known age, and wing length is a reliable measure of age and growth. The rate of growth in nestlings is intrinsic and shows very little geographic or seasonal variation except in severely emaciated nestlings. The nutritional status of nestlings, as determined by lipid reserves, "sets" the maximum body mass at any stage of growth. From hatching to about 60 d of age lipids and other body constituents are rapidly deposited. Thereafter, lipids are primarily deposited as a nutritional reserve, and other constituents are directed to the development of functionally important tissues such as the pectoral muscles.

Hand-reared nestlings consume about 80 kg meat from shortly after hatching to fledging age (about 136 d). Between 60 and 100 d of age (September–October) nestling food consumption is roughly double the quantity of food estimated for active adults to satisfy daily energy expenditure (DEE). In 1982 the Magaliesberg colonies required 1156 cattle carcasses annually, or roughly four carcasses/d.

The potential food resource (livestock carcasses) of the PFA around Magaliesberg, and similarly, that of the apparently favourable southwestern and western sectors within the PFA, exceeds the food requirements of Magaliesberg Cape Vultures by a wide margin.

This study has a valuable bearing on management programmes for the Cape Vulture in rural areas of southern Africa and presents testable results for future conservation-oriented research. **Komen, Joris. 1986. M.Sc. Thesis. Department of Zoology, University of the Witwatersrand, 1 Jan Smuts Avenue, Johannesburg, SOUTH AFRICA. Present address: c/o Bird Department, State Museum, P.O. Box 1203, Windhoek, NAMBIA.**

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ECOLOGICAL RESEARCH ON THE JAPANESE GOLDEN EAGLE *Aquila chrysaetos japonica* DURING THE POST-FLEDGING PERIOD IN THE HAKUSAN RANGE

Five pairs of Golden Eagles in the Hakusan Range of central Japan were studied for seven yr (1978–84). The Hakusan Range is located in the west part of the Japan Alps and consists mostly of deciduous forest. The mean fledging date and age at fledging were 10 June and 76 d, respectively (N = 5). From a few days before fledging eaglets began to walk out of and return to the aerie. Eaglets fledged without any coaxing from their parents. During one to two wk after fledging, juveniles seldom flew and had poor flight ability until ca three to four wk after their first flight. Development of flight ability varied according to topography near the aerie. Juveniles roosted in the vicinity of the aerie until three to four wk after fledging. Thereafter juveniles perched most frequently in trees on ridge tops. Expansion of home range of juveniles was related to development of flight ability. Juveniles were fed by their parents until at least three to four wk after fledging. Prior to being fed by the parent, "dueting" (mutual calling) and "postponement of prey delivery" (the parent with prey flew in front of its offspring time after time) were performed. Dueting facilitated

locating juveniles in forest habitat, and delayed prey delivery encouraged juvenile flight. Shortly after fledging, juvenile eagles began to attempt hunting. However, juveniles remained dependent on their parents until early winter when, as they became increasingly independent, each left the area of its own accord. **Ikeda, Yoshihide. 1985. M.S. Thesis, Kanazawa Univ., Japan. 302 pp. (In Japanese). Present address: Division of Life Sciences, Graduate School of Natural Science & Technology, Kanazawa University, Marunouchi 1-1, Kanazawa 920, Japan.**

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ASPECTS OF THE ECOLOGY, FOOD HABITS AND FORAGING CHARACTERISTICS OF GYRFALCONS IN THE CENTRAL CANADIAN ARCTIC

A population of breeding Gyrfalcons (*Falco rusticolus*), studied from 1982–1986 on a 2000 km^2 study area in the central arctic of the Northwest Territories, occupied 14 to 18 territories each year. The mean internest distance was 10.6 km, giving a density that approaches the highest recorded. There was a tendency for regularity in spacing of territories. Most (85%) nests were in abandoned stick nests of Ravens (*Corvus corax*) or Golden Eagles (*Aquila chrysaetos*) ($\bar{X}$ ± SD) of clutch was 3.80 ± 0.52, of brood was 2.53 ± 0.89, and mean productivity was 1.50 ± 1.43 fledged young. Reproductive success declined with increased severity of spring weather.

Three prey species, Rock Ptarmigan (*Lagopus mutus*), Arctic Ground Squirrel (*Spermophilus parryii*) and Arctic Hare (*Lepus arcticus*), accounted for 96.5% of the total prey biomass identified. Gyrfalcons responded functionally to the varying availability of prey. Ptarmigan and hares were taken in May and June of all years (98.2% biomass). About 1 July, when nestling Gyrfalcons were growing rapidly, juvenile ground squirrels emerged and vulnerability of ptarmigan appeared to decline. Squirrels were used extensively in July and August of 1984 and 1985, but in 1986 there was a nearly complete failure of squirrel production, and ptarmigan continued to be the dominant prey species throughout the summer. Spring counts suggested densities of breeding ptarmigan were relatively constant during the study. Mean weight of prey taken by male Gyrfalcons (250 g) was significantly less than prey captured by females (330 g) (*t*-Test; t = −1.81; P = 0.036). As predicated by optimal foraging theory, larger prey items, on average, were brought to the nest as foraging time away from the nest increased.

Brood size was manipulated at two Gyrfalcon nests in 1986. The parent birds responded to altered brood size by compensatory changes in total prey biomass fed to the nestlings, suggesting that food was not limiting brood size. Conditions of food abundance were also observed at nests of unmanipulated broods, indicating that food was not limiting during the nestling period. I suggest that spacing of pairs was set during courtship and prelaying when food was most likely to be limiting. Courtship and prelaying coincided with the yearly low in prey availability and a period when the male was doing most of the hunting for himself and the female. The observation that most pairs did not initiate laying until after the spring arrival of migrating ptarmigan is consistent with this conclusion. **Poole, K. G. 1987. M.Sc. Thesis, Dept. of Zoology, Univ. of Alberta, Edmonton, Alberta T6G 2E9, CANADA. 120 pp. Present address: Wildlife Management Division, N.W.T. Renewable Resources, Yellowknife, N.W.T. X1A 2L9, CANADA.**

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POST-FLEDGING BEHAVIOR OF THE EASTERN SCREECH-OWL (*Otus asio*)

Three families of Eastern Screech-Owls (*Otus asio*) (six adults and 10 juveniles) were radio-tagged and monitored during the post-fledging period in central Kentucky. Fledging dates ranged from 14–27 May 1985. Five hundred fifteen roost sites were located and quantified. Adult and juvenile Eastern Screech-Owls used open limbs (46.4%), tangles (31.9%), and conifers (21.7%) for roosting; tree cavities were not used during the study period. Twenty-eight species of trees and shrubs were used for roosting; Eastern redcedar (*Juniperus virginiana*) (26.8%) and shagbark hickory (*Carya ovata*) (18.3%) were selected most often. Families differed significantly in mean roost height, roost tree height, roost tree diameter, distance between daily roost sites, distance from nest, distance from male, and the distance from female roost site. There were no significant differences among adults and juveniles for the above roost site variables. Mean distance between roost sites of juveniles and those of both adult males and adult females increased significantly after the fifth week post-fledging, possibly suggesting a time when juveniles are becoming independent of parents.